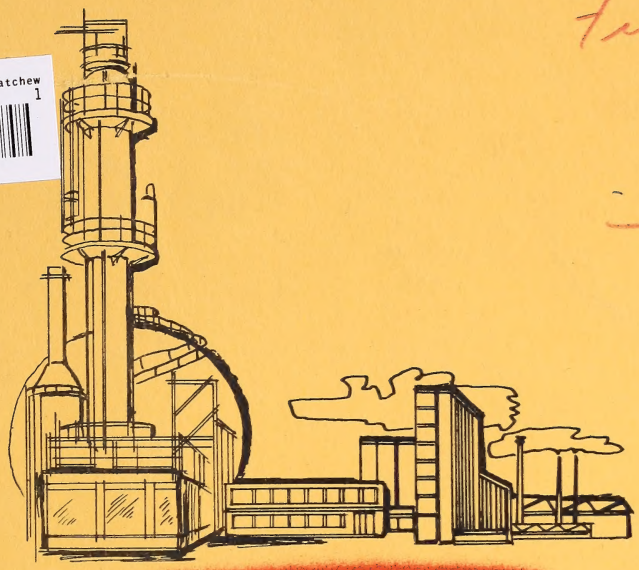
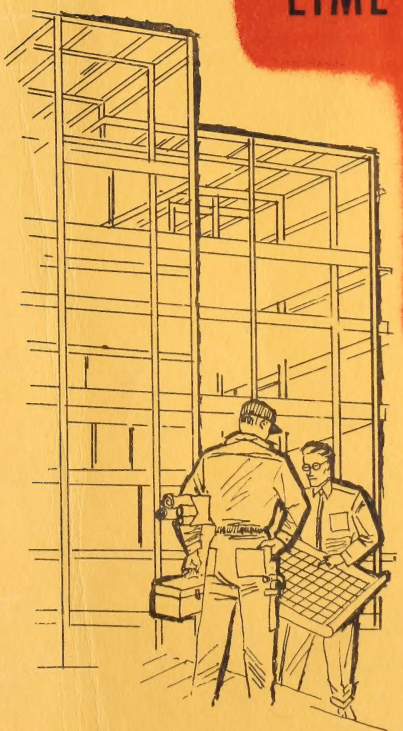
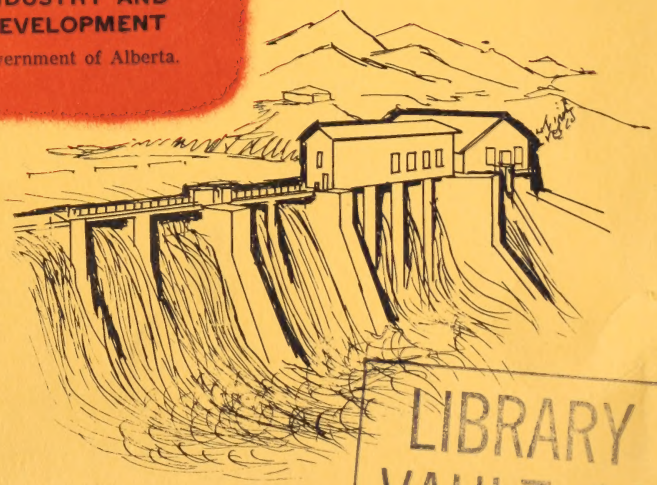


Report on
LIME CONSUMPTION



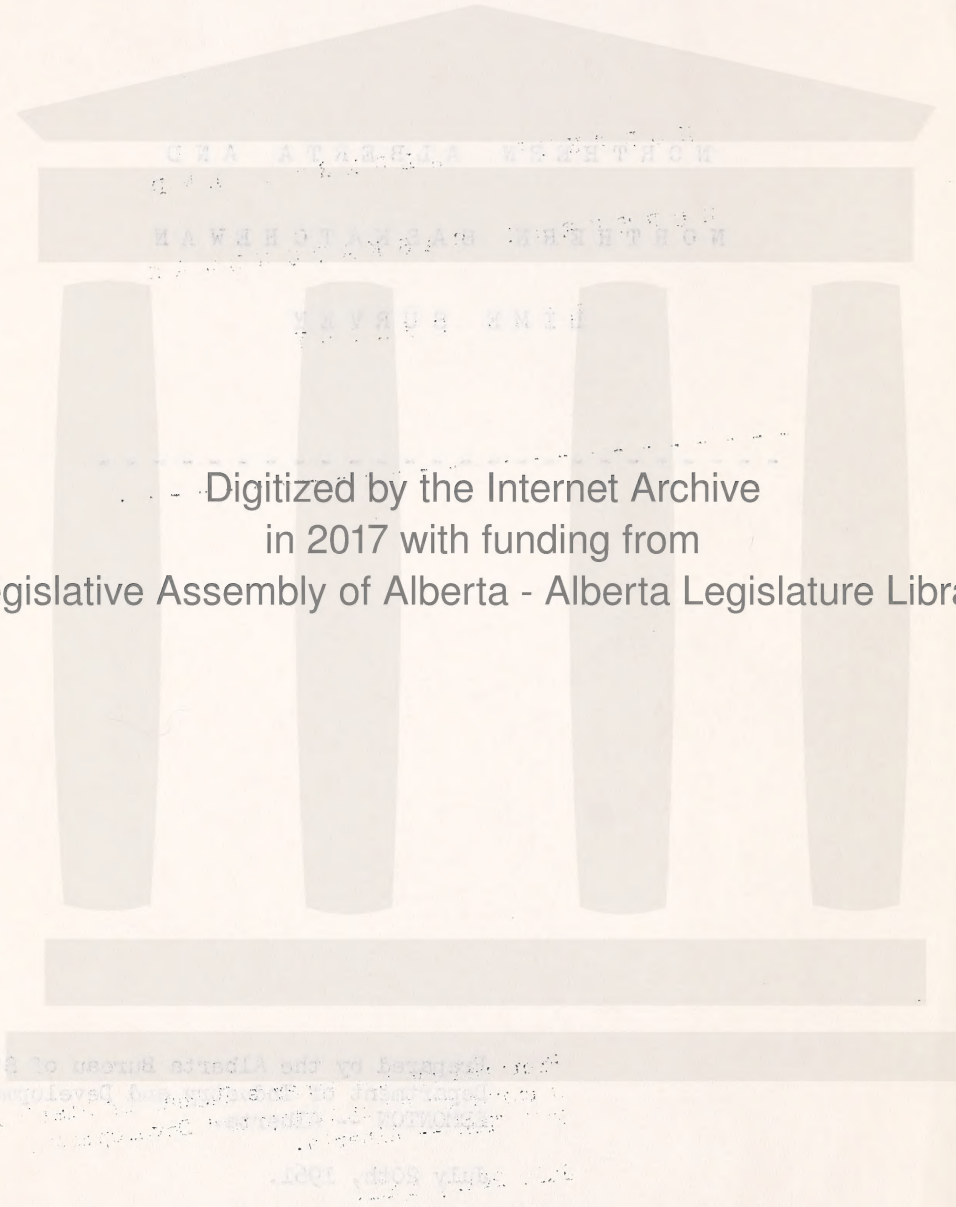
PREPARED BY THE
DEPARTMENT OF INDUSTRY AND DEVELOPMENT
Government of Alberta.



NORTHERN ALBERTA AND NORTHERN SASKATCHEWAN LIME SURVEY

Prepared by the Alberta Bureau of Statistics,
Department of Industry and Development,
EDMONTON -- Alberta.

July 20th, 1961.



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NORTHERN ALBERTA AND NORTHERN SASKATCHEWAN LIME MARKET
JULY - 1960

INTRODUCTION:

Limestone is an essential raw material of an industrial economy and, because of its low costs and bulk required, deposits must be situated comparatively close to manufacturing centres.

In Alberta, limestone is used chiefly for the manufacture of cement and lime.[1]

Lime itself may be used for medicinal purposes, insecticides, plant and animal food, gas absorption, precipitation, dehydration and causticizing. It is employed as a reagent in the sulfite process for paper making, dehairing hides, recovering by-product ammonia, manufacturing of high grade steel and cement, water softening, manufacturing of soap, rubber, varnish, refractories, and sand-lime brick. It is indispensible for mortar and plaster use and serves as a basic raw material for calcium salts and for improving the quality of certain soils.

Lime is sold as a high calcium quick lime containing not less than 90 per cent of calcium oxide and from 0 to 5 per cent of magnesium with small percentages of calcium carbonate, silica, alumina, and ferric oxide present as impurities.[2] The suitability of lime for any particular use depends on its composition and physical properties, all of which can be controlled by the selection of the limestone and the detail of the manufacturing process. Much lime must be finely ground before use.

Depending on the composition, there are several distinct types of limes. Hydraulic limes are obtained from the burning of limestone containing clay, and the nature of the product obtained after contact with

water varies from a putty to a set cement. The high-calcium-content limes harden only by absorption of carbon dioxide from the air, which is a slow process; hydraulic limes also harden slowly but they can be used under water. For chemical purposes high-calcium lime is required except for the sulfite paper process where a magnesium lime works better.

PRODUCTION:

In Southern Alberta, lime is produced by three firms at five locations. Loders Lime Company Ltd., quarries limestone and produces lime at Kananaskis, Alberta. Summit Lime Works Ltd., quarries limestone in the Crowsnest Pass area, produces lime there and also supplies the Canadian Sugar Factories Ltd., with limestone for the production of lime at Picture Butte, Taber and Raymond. This lime is used in their sugar refining operations.

The lime produced in Alberta is a high calcium lime which finds ready use in the construction trade, in water treatment plants and in manufacturing firms throughout the province.

In 1959, Alberta lime production totalled 43,709 tons for a value of $742,000 (See Table II)

Alberta producers supply all of the Provinces' needs as well as supplying some lime for export.

Saskatchewan must import virtually all of its requirements of lime.

LIMESTONE DEPOSITS - NORTHERN ALBERTA:

There are six major limestone deposits in Northern Alberta which could be economically exploited. However, of these six deposits, three (Roche Miette, Henry House and Brule) are in Jasper National Park, and

their exploitation is therefore prohibited by law. Only the deposits outside the park will be discussed.

ANALYSIS OF DEPOSITS:

(1) NORDEGG:

About 4.5 miles east of Nordegg, a thick succession of impure cherty limestone of Devonian Mississippian Age is exposed along the Canadian National Railway and has been described by (Goudge 1944). Relatively pure limestone occurs in the sequence in layers up to 50 feet thick. Analysis 14 is representative of one 50 foot layer described by Goudge as occuring a few hundred yards northeast of Mile 146 on the railway.

One mile east of Nordegg, at Mile 148.5 on the Canadian National Railway, a small quarry has been opened for ballast in a twenty foot bed of limestone of which the upper 10 feet is pure. West of the quarry, a 40 foot bed of pure limestone is exposed. Analysis 15 and 16 were made by Goudge on the 10 and 40 foot beds respectively.[3]

(2) CADOMIN:

"Devonian Mississippian Limestone is exposed along the Canadian National Railway Mountain Park Line for approximately 500 feet immediately north of the 25 mile post (Goudge 1944). The strata strike east and dip to the south (35 to 60 degrees). Analysis 17, represents a channel sample, taken by Goudge of the most northerly 300 feet of the exposures which are from 180 to 250 feet in thickness. Several cherty beds occuring in the sequence were not sampled. Analysis 18 represents the southerly 200 feet of the exposure which is 100 to 175 feet in thickness.

South of the 25 mile post a small ridge of limestone outcrops near the railway, just north of Cadomin Creek. Analysis 19 is represent-

ative of this material".

(3) McMURRAY:

Beaverhill Lake Limestone of Upper Devonian Age is exposed near river level at the junction of the Clearwater and the Athabasca Rivers. A grab sample of the limestone was collected by the Research Council of Alberta from the north bank of the Clearwater at its junction with the Athabasca, immediately across the Clearwater River from McMurray. Analysis 25 is representative of this sample.5"

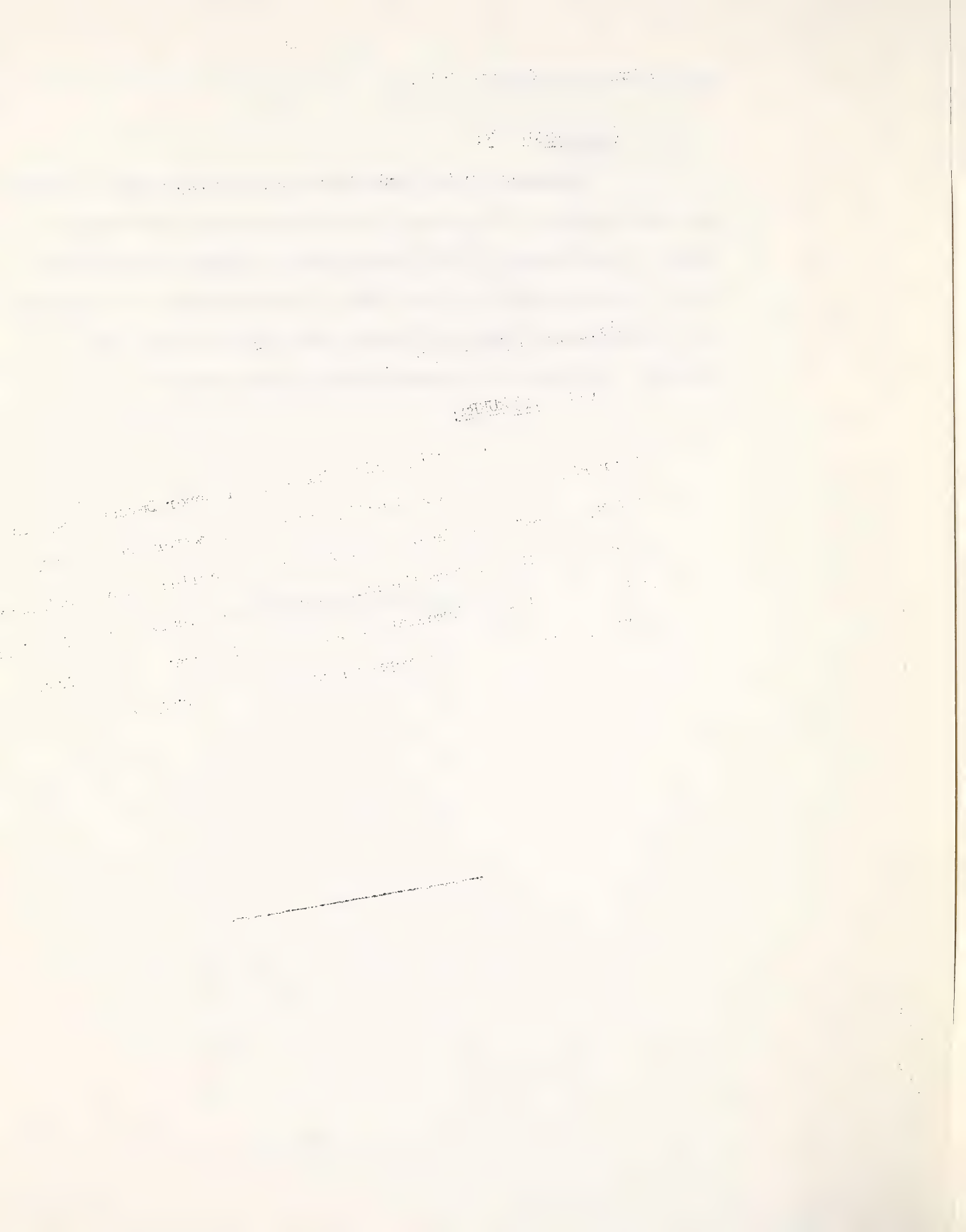

TABLE I

SELECTED ANALYSIS FROM TABLE 4:

Chemical Analysis of Limestone
Discussed in the Research Council of Alberta,
Geological Division, Preliminary Report 58 - 2, p. 66

Analysis Number	Name of Deposit	Thickness in Feet	SiO_2	Fe_2O_3	Al_2O_3	$Ca_3(PO_4)_2$	$CaCO_3$	$MgCO_3$	TOTAL	CaO	MgO
14	Nordegg	50	5.26	0.49	1.73	0.13	85.62	6.56	99.79	48.02	3.14
15	Nordegg	10	0.42	0.06	0.17	0.02	95.25	4.20	100.12	53.37	2.01
16	Nordegg	40	0.24	0.04	0.21	0.02	97.96	2.00	100.47	54.87	0.95
17	Cadomin	150	0.98	0.23	0.29	0.02	92.45	5.90	99.87	51.78	2.82
18	Cadomin	100	1.14	0.24	0.22	0.02	96.00	1.83	99.45	53.77	0.87
19	Cadomin	Unknown	0.98	0.30	0.22	0.01	95.03	3.01	99.55	53.22	1.44
25	McMurray	Unknown	1.66	0.21	1.28	n.d.	95.18	1.11	99.44	53.33	0.53

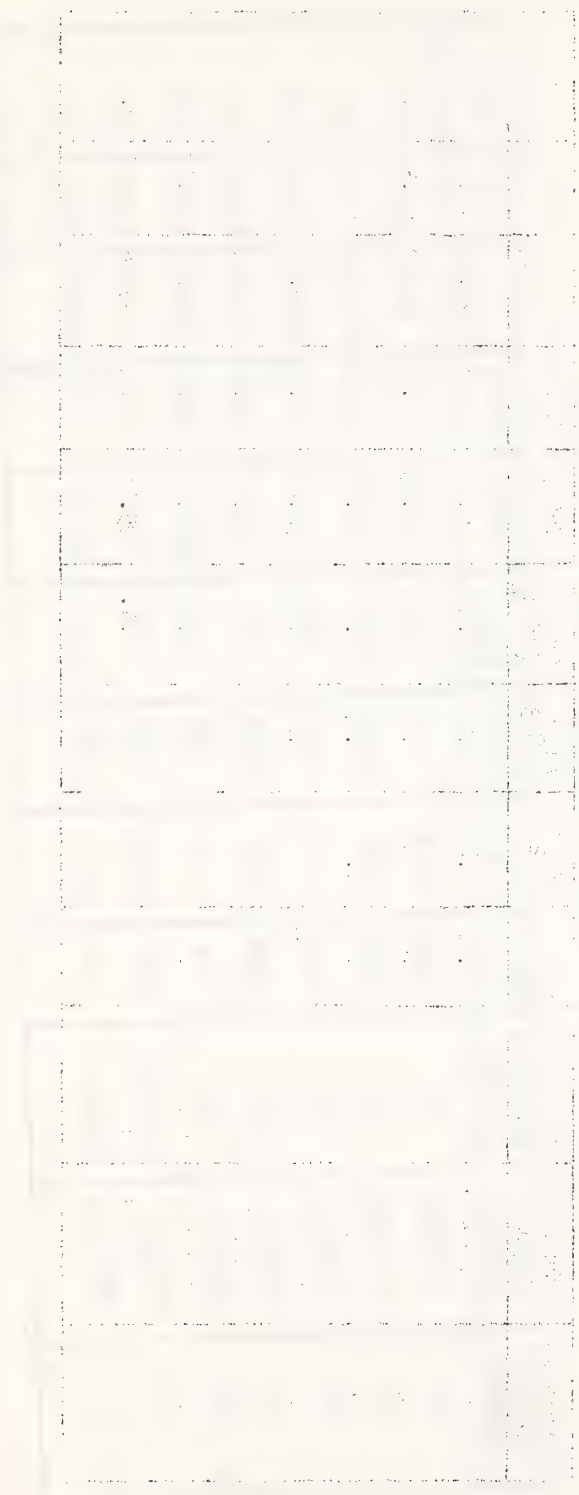

TABLE II

PRODUCERS SHIPMENTS* OF LIME
SHOWING PURPOSE FOR WHICH USED OR SHIPPED--ALBERTA 1957-1959

	1957		1958		1959	
	Quantity tons	Value $	Quantity tons	Value $	Quantity tons	Value $
Quick Lime Building Trades:						
Finishing Lime	8,567	124,377	8,537	126,750	13,374	220,760
Masons Lime	3,345	58,432	4,000	73,400	-**	-**
Industrial:						
Non-Ferrous Smelters	3,744	54,928	3,713	56,294	2,242	29,146
Iron and Steel Furnaces	3,000	52,410	3,200	58,720	1,120	11,608
Cyanide and Floatation	60	780	234	3,042	-	-
Pulp and Paper Mills	-	-	-	-	240	4,320
Sugar Refineries	12,399	198,544	14,073	225,168	11,483	229,660
Sand-Lime, Brick Plants	-	-	-	-	839	8,390
Insectide Plants	-	-	-	-	150	2,700
Other Industrial Uses	1,500	26,205	1,151	21,121	-	-
Other Consumers	4,420	75,340	3,860	68,950	6,660	118,080
Total Quick Lime:	37,035	591,016	38,768	633,445	36,108	624,664

Shipped from Plants in Alberta.
*Includes Amounts used in Producers own works.
**Reports not received before publication.

T A B L E II (Continued)

	1957		1958		1959	
	Quantity tons	Value $	Quantity tons	Value $	Quantity tons	Value $
Hydrated Lime:						
Building Trades						
Finishing Lime	1,525	22,525	2,187	32,335	3,485	51,245
Masons Lime	1,100	21,733	2,200	39,336	-	-
Industrial:						
Uranium Plants	-	-	-	-	1,052	17,884
Non-Ferrous Smelters	90	1,170	125	1,625	45	585
Cyanide and Floatation Mills	584	7,590	960	12,480	380	4,940
Fertilizer Plants	-	-	-	-	-	-
Other Industrial Uses	870	17,183	1,600	28,608	1,558	26,486
Other Consumers	1,019	17,020	1,272	19,783	1,081	16,033
Total Hydrated:	5,188	87,221	8,344	134,167	7,601	117,173
GRAND TOTAL	42,223	678,237	47,112	767,612	43,709	741,837

CONSTRUCTION:

Residential: As is indicated by the following table, the greatest proportion of dwelling units constructed in Northern Alberta have been built in the city of Edmonton.

TABLE III

CONSTRUCTION OF DWELLING UNITS
CENTRES OF 5,000 POPULATION OR MORE
NORTHERN ALBERTA 1956 - 1960

	1956	1957	1958	1959	1960
CAMROSE - Started	-	21	39	65	76
- Completed	-	32	25	59	85
EDMONTON - Started	3,203	3,320	5,805	4,004	2,180
- Completed	3,350	3,957	4,702	4,995	3,328
GRANDE PRAIRIE - Started	-	60	151	79	78
- Completed	-	42	171	59	72
LLOYDMINSTER - Started	-	9	20	57	53
- Completed	-	-	16	50	27
RED DEER - Started	131	153	264	315	163
- Completed	180	107	214	312	227
T O T A L - Started	3,333	3,563	6,279	4,520	2,550
- Completed	3,530	3,138	5,128	5,475	3,739

5 year Average 1956 - 1960	-- Started	4,049
	-- Completed	4,202
5 year Average 1953 - 1957	-- Started	3,702
	-- Completed	3,727

Over the past five years, approximately 4,200 dwelling units (see Table III) have been completed in Northern Alberta.

Because of the growing trend to drywall construction, the Lath and Plaster Institute of Alberta, the Edmonton House Builders Association, Central Mortgage and Housing Corporation, three plaster contractors and

three drywall manufacturers were contacted in an attempt to determine what percentage of houses are of drywall construction as compared to those constructed from plaster and stucco.

Three estimates were for 50 per cent drywall and 50 per cent for plaster and stucco. The other six estimated were 40 per cent for drywall and 60 per cent for plaster and stucco. The 60 per cent figure also includes houses which have drywall inside and stucco on the outside. It was felt that this latter ratio would prevail for several years to come.

There is approximately 1,200 pounds of lime used in a house which is finished with plaster and stucco. For the purpose of this report it was assumed that each dwelling unit would approximate 1,000 square feet of floor space and that larger homes would tend to balance off against smaller apartments.

Of the 4,200 completed houses in Northern Alberta, 60 per cent or 2,520 would require 2,520 x .6 tons = 1,512 tons of lime.

In Northern Saskatchewan there is an average of 1,550 houses (See table VI) completed per year of which 60 per cent or 930 would require lime for plaster and stucco work. On this basis, 930 x .6 = 558 tons of lime would be required.

The amount of lime required for residential construction in other urban and rural centres in Northern Alberta and Northern Saskatchewan would be approximately 600 tons.

If the present rate of residential construction continues in the future as it has in the past, in Northern Alberta and Saskatchewan, there will be a market for at least 2,670 tons of lime per year for residential construction.

INDUSTRIAL AND COMMERCIAL:

In addition to the figures (Table IV) for lime used in residential construction there is the lime which is used for industrial and commercial construction. Here the estimates are much more difficult to make since there are no average sizes for industrial or commercial structures. Consequently, again only an estimate can be made for the amount of lime required for this type of construction.

It was felt that there is more lime used in plaster, stucco and masonry work in industrial and commercial structures than there is in residential buildings. Therefore, it was estimated that approximately 2,000 tons of lime might be used for industrial and commercial construction in Northern Alberta while 775 tons would be used for the same purpose in Northern Saskatchewan.

The persons contacted regarding the requirements for lime for residential construction felt that the estimated requirements of lime for industrial and commercial construction were as reliable as they could possibly be under the circumstances. There is no published data available which provides a detailed breakdown of the type required for a study of this nature.

TABLE IV

VALUE OF RESIDENTIAL AND NON-RESIDENTIAL CONSTRUCTION
METROPOLITAN EDMONTON 1956 -- 1960

Year	Total Residential	Industrial	Commercial	Institutional & Government	Other	Total Non-Residential	Total Residential and Non-Residential
	$000	$000	$000	$000	$000	$000	$000
1956	39,110	10,045	20,036	11,817	465	42,363	81,673
1957	41,058	4,745	17,331	11,371	407	33,854	74,912
1958	58,238	6,573	15,613	15,085	383	37,654	95,892
1959	61,096	7,086	20,830	18,111	54	46,081	107,177
1960	30,053	4,268	14,110	21,530	135	40,041	70,096
5 year Average	45,951	6,543	17,584	15,583	288	39,999	85,950
1953-57 Average	38,212	5,564	13,604	11,987	459	31,614	69,826

Both the preceding tables show substantial increases in the 5 year averages (1956 - 60 over 1953 - 57) in all classifications except in the "Other" group in the latter table.

However, care must be exercised in using these averages since they cover up any substantial increase or decrease from year to year.

For example, in Edmonton in 1958, 2,485 more houses were started in the city than in 1957. In 1960, there was a slump in new residential construction, and only 2,180 dwelling units were started. This is 1,824 units less than were started in the previous year.

These averages have been determined merely as an aid in calculating the requirements of lime in residential construction. Because construction activities fluctuate a great deal from year to year, anyone using these averages should also consider the starts and completion figures for each individual year in order to obtain a more realistic analysis.

TABLE V

CONSTRUCTION OF DWELLING UNITS IN URBAN CENTRES OF 5,000 POPULATION AND OVER
NORTHERN SASKATCHEWAN 1956 -- 1960

	1956	1957	1958	1959	1960
LLOYDMINSTER - Started	-	-	-	10	34
- Completed	-	-	-	4	26
NORTH BATTLEFORD - Started	40	86	199	126	66
- Completed	39	101	120	135	101
PRINCE ALBERT - Started	122	259	258	331	130
- Completed	113	182	329	271	178
SASKATOON - Started	990	1,080	1,481	1,629	1,137
- Completed	878	1,103	1,349	1,325	1,548

5 year Average 1956

- Started 1,595
- Completed 1,560

TABLE VI

VALUE OF RESIDENTIAL AND NON-RESIDENTIAL CONSTRUCTION
NORTH BATTLEFORD, PRINCE ALBERT AND SASKATOON, SASKATCHEWAN 1958 - 1960

Year	Total Residential	Industrial	Commercial	Institutional & Government	Other	Total Non-Residential	Total Residential and Non-Residential
	$000	$000	$000	$000	$000	$000	$000
1958	20,811	1,161	5,899	8,526	8	15,594	36,405
1959	24,203	1,591	4,836	9,950	8	16,385	40,588
1960	14,691	2,714	7,298	7,695	10	17,717	32,408
3 year Average	19,901	1,822	6,011	8,727	9	16,565	36,467

T A B L E VII

CONSUMPTION OF LIME IN MUNICIPAL WATERWORKS
1948 - 59 Excluding 1952-55
(Pounds)

Year	Alberta	Saskatchewan	Manitoba	Canada
1959	13,790,723	1,209,538	3,139,937	22,592,534
1958	11,856,578	964,285	3,518,558	20,166,085
1957	11,963,444	1,058,784	2,524,584	18,937,351
1956	10,929,644	103,575	2,663,300	17,099,939
1951	6,988,700	-	1,564,900	11,094,000
1950	6,939,600	-	1,600,600	10,679,000
1949	7,716,690	-	2,057,250	12,063,182
1948	6,594,854	-	892,450	9,756,048

WATER TREATMENT:

City of Edmonton:

The City of Edmonton Water Treatment Plant used 7,036 tons of lump quicklime (crushed to one inch and smaller) for water softening in 1960. The lime used for water softening must meet the standards set by the American Water Works Association. These specifications require that the lime must be of a grade which contains 88 per cent of CaO. Lime with a CaO content of over 88 per cent is bought at a bonus of 2 per cent of the invoice price for each 1 per cent of CaO over the required 88 per cent. A corresponding penalty is charged for lime of less than 88 per cent purity. During 1960 the price for lime delivered to the Edmonton Water Treatment Plant was $21.60 per ton (excluding the bonus). The bonus, during 1960 averaged approximately 9 per cent. This brings the cost of the lime delivered in Edmonton to $23.54 per ton. The lime is shipped by hopper-bottom rail cars from Southern Alberta and then delivered by truck to the plant.

The following table shows the consumption of lime at the Edmonton Water Treatment Plant during 1960.

TABLE VIII

CONSUMPTION OF LIME--EDMONTON WATER TREATMENT PLANT

	Tons per Month for 1960
January	609
February	701
March	625
April	534
May	682
June	555
July	495
August	455
September	397
October	534
November	650
December	799
TOTAL	7,036 tons

The consumption of lime in the Edmonton Water Treatment Plant will increase by approximately the same ratio as the increase in water consumption. The increase for 1961 is expected to be approximately 5-7 per cent over 1960.

TABLE IX

CONSUMPTION OF WATER
CITY OF EDMONTON 1957 - 1961

	Millions of Gallons per Day
1957	22
1958	23
1959	23
1960	25.8
1961	27.4 (Estimated)

The Average increase over the past five years has been 4 1/2 % per annum.

The present maximum daily capacity of the water plant is 60-80 million gallons. There is preliminary work being done on a 20-30 million gallon plant extension. If these preliminary plans are approved, this extension will be completed sometime in 1966 or 1967, giving the plant a maximum daily capacity of 80 - 92 million gallons.

All of the villages, towns and cities in Northern Alberta which spent over $1,000 on water treatment in 1959 were contacted regarding their consumption of lime for water treatment. The following table indicates their requirements of lime during 1960 and changes predicted for 1961.

TABLE X

CONSUMPTION OF LIME FOR WATER TREATMENT
NORTHERN ALBERTA -- 1960

Name	1960 Requirements		Changes in 1961
City of Edmonton	7036.0	tons	+ 5 - 7%
Red Deer	301.0	tons	+ 10%
Lloydminster	56.0	tons	+ 80%[1]
Redwater	37.5	tons	+ 2%
Fahler	18.5	tons	-
Castor	5.5	tons	-
Fairview	12.0	tons	+ 2.5%
Vegreville	9.0	tons	-
Leduc	.5	tons	-
Spirit River	1.2	tons	-
Rycroft	-		10 - 15 tons[2]

1. Plant was only used 7 months during 1960 instead of 12 months.

2. Proposed use - Not sure of date.

In Saskatchewan, only the cities of Saskatoon, Prince Albert and North Battleford were contacted regarding their requirements of lime for water softening.

TABLE XI

CONSUMPTION OF LIME FOR WATER TREATMENT-1960
NORTHERN SASKATCHEWAN

Name	1960 Requirements		Changes in 1961
Saskatoon	2,080	tons	-- 1
Prince Albert	-		-- 2
North Battleford	-		-- 3

1. Predict increase in proportion to population growth and water consumption.

2. Do not soften water at present. However, because water conditions are similar to those of Edmonton, the city is considering treatment of their water, perhaps within the next two years.

3. Questionnaire not returned.

INDUSTRIAL CONSUMPTION

NORTHERN MINING OPERATIONS:

There is a substantial amount of lime used in northern mining operations.

In the uranium mines, high calcium lime is used to neutralize waste sludges. High calcium lime is also used in the smelting and refining of non-ferrous ores. Lime is used as a depressant in the ore floatation process and in pH control in the recovery of minerals by the cyanidation process.

The major mines in the area used 2,600 tons of lime in 1960 (confirmed figures). It was estimated that the smaller mines would use approximately 400 tons, bringing the total requirements to 3,000 tons.

OIL REFINERIES AND GAS PROCESSING PLANTS:

In Northern Alberta during 1960, oil refineries and gas processing plants used 565 tons of lime.

OTHER INDUSTRIES:

The manufacturing industries of Northern Alberta, comprising the Tanning industry, the Glass industry, the Iron and Steel industry and a miscellaneous industry category used 2,205 tons of lime in 1960. Of this total, 400 tons (confirmed figures) were used for industrial water treatment. Future requirements of lime for industrial consumption will

depend upon larger markets and increased production.

As far as could be determined, there is no lime used for brine purification. The two most common chemicals used for this purpose are soda ash and caustic soda.

There is a possibility that lime could be used for brine purification but no information regarding the costs, or results, etc., could be found.

The City of Edmonton does not use any lime for waste or sewage disposal.

The Provincial Department of Highways has, in the past, used lime for stabilization of soils. However, they have discontinued this practice because lime is water soluble. Because of this fact, the Department feels that the expenditure on lime for this purpose is unwarranted.

The Department has no future plans regarding the use of lime for road stabilization.

SUMMARY:

The total apparent consumption of lime in the area north of Red Deer in Alberta and in Northern Saskatchewan is presented in the following table.

T A B L E XII

TOTAL CONSUMPTION OF LIME 1960
NORTHERN ALBERTA AND NORTHERN SASKATCHEWAN

USE		TONS
RESIDENTIAL CONSTRUCTION:		
Northern Alberta	1,512	
Northern Saskatchewan	558	
Other Urban and Rural Centres in Northern Alberta and Saskatchewan	660	2,670
NON-RESIDENTIAL CONSTRUCTION:		
Northern Alberta	2,000	
Northern Saskatchewan	775	2,775
WATER TREATMENT:		
Cities, Towns and Villages	9,557	9,557
INDUSTRIAL CONSUMPTION:		
Northern Mining Operations		
Confirmed	2,600	
Estimated	400	3,000
Oil Refineries and Gas Processing Plants		565
Other Industries		2,205
TOTAL CONSUMPTION		20,772 tons

The lime market in Northern Alberta and Northern Saskatchewan is not a rapidly expanding market. Seventy-two per cent of the total amount of lime consumed in the area is required for construction (both residential and non-residential) and for water treatment.

It would appear that future requirements will therefore

depend upon the growth of population which in turn will determine the need for the various types of construction and the amount of water requiring treatment in the areas considered in this report.

It is very difficult to predict what the future requirements for lime in the Northern Mining Operations will be. The largest portion of lime in this industry is used in the uranium mines. Unless new markets are opened to the uranium industry, the market for lime in uranium processing will be relatively stable or could perhaps even decline. The future will depend to a great extent on the actions of the Federal Government.

Lime used in oil refining and gas processing and in other miscellaneous industries will depend to a great extent on increased production brought about by normal increases in consumption.

APPENDIX

CHEMICAL COMPOSITION OF LIME USED IN THE BUILDING TRADES

These specifications have been obtained from the following series on Lime Materials and Products compiled by the C.S.A. (Canadian Standards Association) at Ottawa in 1950.

A82.40 - 1950 - Specifications for Methods of Chemical Analysis of Limestone, Quicklime and Hydrated Lime.

A82.41 - 1950 - Methods of Physical Testing of Quicklime and Hydrate Lime.

A82.42 - 1950 - Quicklime for Structural Purposes.

A82.43 - 1950 - Hydrated Lime for Masonry Purposes.

A82.44 - 1950 - Normal Finishing Hydrated Lime.

A82.45 - 1950 - Methods of Sampling, Inspection, Packing and Marking of Quicklime and Lime Materials.

EXERPTS FROM:

A82.42 - 1950 - Quicklime for Structural Purposes -- This Specification is in substantial agreement with specification C5 - 26; Quicklime for Structural Purposes of the American Society for Testing Materials.

Scope: (1) This specification covers all classes of quicklime such as crushed lime, granular lime, ground lime, lump lime, pebble lime and pulverized lime used for structural purposes.

CHEMICAL COMPOSITION:

(2) The Quicklime shall conform to the following requirements as to chemical composition calculated to the non-volatile basis.

	Calcium Lime	Magnesium Lime
Calcium Oxide minimum per cent	75	-
Magnesium Oxide minimum per cent	-	20
Silica, Alumina and oxide of iron, maximum per cent	5	5
Carbon dioxide maximum per cent:		
If sample taken at place of manufacture	3	3
If sample taken at any other place	10	10

RESIDUE:

(3) The quicklime shall not contain more than 15 per cent by weight of residue.

A82.43 - 1950 - Hydrated Lime for Masonry -- This specification is in substantial agreement with specification C207 - 49 - Hydrated Lime for Masonry Purposes of the American Society for Testing Materials.

Scope: (1) This specification covers normal hydrated lime which is suitable for use in mortar, the scratch or brown coats of plaster for stucco and for addition to Portland Cement Concrete.

CHEMICAL COMPOSITION:

(2) Hydrated Lime for Masonry Purposes shall conform to the following requirements as to chemical composition.

Calcium and Magnesium Oxides (Non-volatile basis) minimum per cent 9

Carbon dioxide (as received basis) maximum per cent:

If sample taken at place of manufacture .....

If sample taken at any other place .....

RESIDUE:

(3) Residue retained on a No. 30 (590 micron) sieve shall

not be more than 0.5 per cent (For more detail, reader is referred to actual specification).

A82.44 - 1950 - Normal Finishing Lime -- This specification is in substantial agreement with specification C6 - 49 - Normal Finishing Hydrate Lime of the American Scoiety for Testing Materials.

Scope: (1) This specification covers one type of finishing hydrate lime which is suitable for use in the scratch, brown and finish coats of plaster for stucco, mortar and as addition to Portland Cement Concrete. Lime sold under this specification shall be designated Type - N - Normal Finishing Lime.

CHEMICAL COMPOSITION:

(2) Type N - normal finishing hydrate shall conform to the following requirements as to chemical composition.

Calcium and Magnesium Oxides (non-volatile basis) minimum per cent 95

Carbon Dioxide (as received basis) maximum per cent:

If sample taken at place of manufacture 5

If sample taken at any other place 7

RESIDUE:

(3) The per cent of residue of Type N - normal finishing hydrate shall conform to the following requirements.

Residue retained on a No. 30 (590 micron) sieve max. per cent

Residue retained on a No. 200 (74 micron) sieve max. per cent 15

These specifications are incorporated into city bylaw 2106 of the City of Edmonton Building Code.

FOOTNOTES

1. Govett, G.J.S. and Byrne, P.J.S., Industrial Minerals of Alberta, Preliminary Report 58 - 2, Geological Division, Research Council of Alberta, Edmonton, 1958, p. 57.

2. Shreve, R.N., The Chemical Process Industries, two editions, McGra Hill Book Company Inc. New York, 1956, p. 212.

3. Govett, G.J.S., and Byrne, P.J.S., Industrial Minerals of Alberta, Preliminary Report 58 - 2, Geological Division, Research Council of Alberta, Edmonton, 1958, p. 57-63.

4. Ibid p. 62

5. Ibid p. 64

6. Ibid p. 66

7. Dominion Bureau of Statistics, Producers Shipments of Lime, showing Purposes for which used or shipped 1955 - 1959, The Lime Industry Queens Printer, Ottawa, Annual.

8. Dominion Bureau of Statistics, Construction of Dwelling Units, 1955 1960, New Residential Construction, Queens Printer, Ottawa, Annua

9. Alberta Bureau of Statistics, Department of Industry and Developm Northern Alberta Lime Market, May 20, 1958.

10. Dominion Bureau of Statistics, Value of Residential and Non-Reside ial Construction, Building Permits, Queens Printer, Ottawa, Annua

11. Dominion Bureau of Statistics, Construction of Dwelling Units in Urban Centres of 5,000 population and over, New Residential Construction, Queens Printer, Ottawa, Annual.

12. Dominion Bureau of Statistics, Value of Residential and Non-Resid- ential Construction, Building Permits, Queens Printer, Ottawa, An

13. Dominion Bureau of Statistics, Consumption of Chemicals in Municip Water Works, Queens Printer, Ottawa, Annual.

14. Personal Communication.

15. Personal Communication.

16. Personal Communication.

17. Personal Communication.

18. Personal Communication.

19. Canadian Standards Association Series on Lime Materials and Products, Ottawa, 1950.

TABLE II

PRODUCERS SHIPMENTS* OF LIME

SHOWING PURPOSE FOR WHICH USED OR SHIPPED--ALBERTA 1961 and 1963

	1961		1963	
	Quantity tons	Value $	Quantity tons	Value $
Quick Lime Building Trades:				
Finishing Lime	9,448	168,462	8,437	148,168
Masons Lime	-	-	-	-
Industrial:				
Uranium Plants	110	1,980	100	1,800
Non-Ferrous Smelters	2,670	43,390	3,437	58,429
Iron and Steel Furnaces	1,565	28,110	2,472	40,718
Cyanide and Floatation	512	7,710	2,841	45,291
Pulp and Paper Mills	118	1,650	1,701	26,334
Sugar Refineries	11,769	235,380	13,479	269,580
Sand-Lime, Brick Plants	589	8,246	846	13,536
Insecticide Plants	210	3,780	-	-
Other Industrial Uses	-	-	1,786	28,192
Other Consumers	9,443	151,431	10,241	163,856
Total Quick Lime:	36,434	650,139	45,340	795,904
Hydrated Lime Building Trades:				
Finishing Lime	3,176	53,992	2,348	39,916
Masons Lime	-	-	-	-
Industrial:				
Uranium Plants	3,750	63,750	1,500	25,500
Non-Ferrous Metals	59	1,005	60	1,040
Cyanide and Floatation Mills	493	8,381	180	3,060
Fertilizer Plants	-	-	-	-
Other Industrial Uses	-	-	1,711	29,087
Other Users	3,594	61,098	3,685	62,645
Total Hydrated Lime:	11,072	188,226	9,484	161,248
GRAND TOTAL ALL LIME:	47,506	838,365	54,824	957,152

* -- Includes amounts used in producer's own works.

Source: Dominion Bureau of Statistics publication "Lime Manufacturers" 1961 Catalogue No. 44-209, Annual.
1963 - Alberta Bureau of Statistics.

TABLE II

PRODUCING REFINERIES* OF ATMC

EXPORTS PROVIDED FOR UNDER TERMS OF AGREEMENT--ATLANTIC 1962 and 1963

	1962		1963	
	Quantity	Value	Quantity	Value
	Tons	$	Tons	$
Motor Line Building Trades:				
Finishing Line	15,840	140,800	8,437	184,250
Marine Line	-	-	-	-
Industrial:				
Benzine Plants	220	1,980	200	1,800
Blue-Ferrous Medicines	6,670	69,320	1,432	29,440
Tars and Binal Materials	7,250	66,110	3,872	40,172
Chemicals and Plastomatics	320	7,720	4,041	45,221
Pulp and Paper Mills	440	7,260	1,268	22,234
Engine Lubricants	11,190	121,320	12,178	120,040
Coal-Line, Light Plants	870	8,880	640	7,220
Locomotive Plants	210	3,750	-	-
Other Commerce	-	-	1,120	18,200
	31,440	431,840	30,941	419,260
Small Motor Line:	32,490	290,120	44,340	170,320
Chartered Line Trailing Trades:				
Finishing Line	3,210	23,400	4,340	30,240
Marine Line	-	-	-	-
Industrial:				
Benzine Plants	3,190	43,120	1,200	23,200
Tar-Ferrous Metals	20	1,000	80	1,440
Chemicals and Plastomatics Mill:	440	8,240	280	3,200
Petroline Plants	-	-	-	-
Other Industrial Uses	-	-	1,122	20,240
Other Ovens	3,190	47,240	3,240	45,240
Total Chartered Line:	12,240	124,000	9,440	123,240
Grand Total Atl Comp:	44,240	414,240	54,840	293,120

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* -- Includes exports used in producer's own ovens.

Source: Dominion Bureau of Statistics publication "Line Manufacturers" 1963

Catalogue No. 34-203, Annual.

1963 - Alberta Bureau of Statistics.

TABLE III

CONSTRUCTION OF DWELLING UNITS
CENTRES OF 5,000 POPULATION OR MORE
NORTHERN ALBERTA 1961 - 1963

	1961	1962	1963
CAMROSE - Starts	75	89	81
- Completions	67	72	72
EDMONTON - Starts	4,562	4,823	4,883
Completions	3,212	4,800	4,960
GRANDE PRAIRIE - Starts	125	196	267
- Completions	94	197	85
LLOYDMINSTER - Starts	39	55	28
- Completions	34	31	37
RED DEER - Starts	399	506	465
- Completions	328	444	468
T O T A L - Starts	5,200	5,669	5,724
- Completions	3,735	5,544	5,622

Source: Dominion Bureau of Statistics publication,
"New Residential Construction",
Catalogue #64-002, Monthly.

TABLE 112

CONSTRUCTION OF DWELLING UNITS

CLASSES OF 1,000 POPULATION OR MORE

ANNUAL AVERAGE 1961 - 1965

[illegible] - Towns	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible] - Urban	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible] - Towns	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible] - Towns	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible] - Towns	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
T O T A L - Towns	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible] Statistics Bureau of Statistics publication,
"Part Local Permits, Construction",
Statistique 1964-1965, Monthly.

TABLE IV

VALUE OF RESIDENTIAL AND NON-RESIDENTIAL CONSTRUCTION
METROPOLITAN EDMONTON
1961 - 1962

	1961 $'000	1962 $'000	1963 $'000
Total Residential	54,899	59,713	58,431
Industrial	9,862	5,783	4,266
Commercial	12,713	19,091	19,074
Institutional and Government	12,611	28,486	17,100
Other	135	-	-
Total Residential and Non-Residential	90,220	113,073	98,871

Source: Dominion Bureau of Statistics publication - "Building Permits", Catalogue No. 64-001.

TABLE II

STATE OF MANUFACTURES AND NON-MANUFACTURES ESTABLISHMENTS
CLASSIFIED BY INDUSTRY
1901 - 1905

TABLE VIII

CONSUMPTION OF LIME
EDMONTON WATER TREATMENT PLANT - 1963

Month	Tons
January	725
February	585
March	590
April	492
May	640
June	524
July	549
August	595
September	475
October	506
November	570
December	800
TOTAL	7,051

Average unit cost per ton - $22.00

Source: City of Edmonton, Waterworks Department.

TABLE VIII

CONSUMPTION OF LIME

[illegible] WATER INSTALLATION PLANT - 1921

Month	Tons
January	782
February	741
March	784
April	698
May	804
June	788
July	741
August	731
September	672
October	704
November	731
December	698
TOTAL	7,291

Average daily consumption - 20 tons

Source: City of Edmonton, Waterworks Department.

TABLE IX

CONSUMPTION OF WATER
CITY OF EDMONTON - 1957-1962

Year	Million Gallons Per Day
1957	22
1958	23
1959	23
1960	25.8
1961	27.4
1962	26.0
1963	29.3

Source: City of Edmonton, Waterworks Department

TABLE IX

CONSUMPTION OF WATER

CITY OF EDMONTON - 1957-1963

Year	Million Gallons Per Day
1957	22
1958	23
1959	23
1960	25.8
1961	27.4
1962	26.0
1963	29.3

Source: City of Edmonton, Waterworks Department